DETERMINATION OF ACTIVITY CONCENTRATION OF POTASSIUM-40 AND RADON-222 BY USING ITS DAUGHTER PROGENY PLUMBUM-214 AND BISMUTH-214 IN WATER FROM *KG.GAJAH, PERAK* BY USING GAMMA-RAY SPECTROMETERY

EMI SULIANA BINTI MAMAT

Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Applied Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA

MAY 2010

The Final Year Project entitled **"Determination of Activity Concentration of Potassium-40 and Radon-222 by Using Its Daughter Progeny Plumbum-214 and Bismuth-214 in Water by Using Gamma Spectrometry"** was submitted by Emi Suliana Binti Mamat, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences, and approved by

Associate Prof.Dr.Hj.Zaini bin Hj.Hamzah
Supervisor
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor

Mrs.Sabarina Md Yunus
Co-Supervisor
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor

Miss Sabrina M.Yahaya
Project Coordinator
B.Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor

Dr. Siti Halimah Sarijo
Head of Programme
B.Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor

Date: 19/5/2010

ACKNOWLEDGEMENT

In the name of Allah, the Most Merciful and The most Gracious, my gratitude to Him for giving me health, energy, ability and chances to complete this thesis entitle "Determination of Activity Concentration of Potassium-40 and Radon-222 by using its Daughter Progeny Plumbum-214 and Bismuth-214 in Water by Using Gamma Spectrometry" become a reality.

My first sincere gratitude's goes to my supervisor, Assoc. Prof. Dr Haji Zaini bin Hamzah for his continuous guidance moral supports, ideas, helpful, critics, encouragement and kindness to complete this thesis. Special thanks are dedicated to Puan Sabarina Binti Md Yunus who is willing to give and share the information and helpful for this thesis. I would like to express my appreciation to Assoc. Prof. Dr. Ahmad bin Saat, Director of Institute Science for his support, guideline, sharing information and ideas.

I also glad to dedicated a special thank and appreciation to my family for their moral support, advice and expenditures for this thesis. I wish to express my gratitude to all staff members of analytical laboratory who assisted me and share their knowledge skilled and all experiences.

I want to give my special thanks to my group and to those who are involved and contribute direct and indirectly during collected samples at Universiti Teknologi MARA Training centre, Kampung Gajah, Perak. Last but not least, I would like to thank everybody who encourage me during completion this thesis.

Emi Suliana Binti Mamat

TABLE OF CONTENTS

ABSTRACT

DETERMINATION OF ACTIVITY CONCENTRATION OF POTASSIUM-40 AND RADON-222 BY USING ITS DAUGHTER PROGENY PLUMBUM-214 AND BISMUTH-214 IN WATER BY USING GAMMA SPECTROMETER

In this thesis, the ex-mining's lake at Universiti Teknologi MARA Training Centre, Kampung Gajah, Perak was chosen as a study area to determine the activity concentration of radon-222 in water. The water samples collected were measure using gamma spectrometry, with a Hyper Pure Germanium detector. Water samples were directly filled into Marinelli beaker and seals with PVC tape and store for 3 weeks to allow radon-222 and its daughter nuclides were in radioactive equilibrium before counting. The radon activity concentration is determined by taking the weight average of the concentrations derived from gamma-ray lines associated with plumbum-214 and bismuth-214 decay. Radon-222 cannot directly count by gamma-spectrometer because it is not emitted gamma radiation, but it is alpha emitted radionuclides. The activity concentration of radon was compared for two factors which are wet season and dry season and filtered and unfiltered samples. Activities concentrations of radon-222 were determined. There are no significant variations in radon levels among different locations. For dry season, the concentration of radon-222 levels range from 5.47±1.31 Bq/L to 5.93±1.26 Bq/L for unfiltered samples and 4.84±1.34 Bq/L to 5.34±1.31 Bq/L for filtered samples.While for wet season, the radon concentration levels range from 4.4±1.25 Bq/L to 6.39±1.25 Bq/L for unfiltered samples and 3.45±1.25 Bq/L to 5.56±1.33 Bq/L for filtered samples. For dry season, the concentration levels of potassium-40 are in the range from 88.03±4.61 Bq/L to 103.95±3.73 Bq/L for unfiltered and 84.93±4.86 Bq/L to 102.24±4.73 Bq/L for filtered samples. While for dry season, the concentration of potassium-40 is the range from 85.51±4.51 Bq/L to 93.70±4.64 Bq/L for unfiltered samples and for filtered samples is from 74.03±5.60 Bq/L to 87.72±5.08 Bq/L.